NAME: Key

Ch. 7 & 8 REVIEW PACKET

1. Decide whether the following sets of 2 events are disjoint, independent, both, or neither? (no outcomes in common; one event doesn't affect other event)
   a. Rolling a dice and flipping a coin

   disjoint and independent

   b. (From a standard 52 card deck) Picking an Ace and picking a red card (with replacement in between each pick)

   not disjoint (there are red aces), but independent

   c. Rolling a 6 and rolling a 3

   disjoint and indep.

   d. Rolling a 6 and rolling an even number

   not disjoint, but independent

   e. Flipping a coin, and getting a HEAD and getting a TAIL

   disjoint & independent

2. If P(A) = 0.60 and P(B) = 0.21 and P(A∩B) = 0.09, find the following:
   a. P(A U B) = $P(A) + P(B) - P(A \cap B) = 0.6 + 0.21 - 0.09 = 0.72$

   b. P(B|A) = $\frac{P(A \cap B)}{P(A)} = \frac{0.09}{0.60} = 0.15$

   c. Are A and B disjoint events? Why or why not?

   no, $P(A \cap B) \neq 0$

   d. Are A and B independent? Why or why not?

   no, $P(A \cap B) \neq P(A) \cdot P(B)$ $\quad P(B|A) \neq P(B)$

3. If P(D) = 0.17, P(C) = 0.54 and D and C are disjoint, what is the probability of D or C?

   $P(D \cup C) = P(D) + P(C) = 0.17 + 0.54 = 0.71$

4. If P(K)= 0.68, P(R)= 0.22 and K and R are independent, what is the probability of K and R?

   $P(K \cap R) = P(K) \cdot P(R) = (0.68)(0.22) = 0.1496$

5. If P(F) = 0.51 and P(H) = 0.22 and P(H|F) = 0.12, find the following:

a. P(F and H) = $P(F \cap H) = P(F) \cdot P(H|F) = (0.51)(0.12) = 0.0612$

b. P(F or H) = $P(F \cup H) = P(F) + P(H) - P(F \cap H) = 0.51 + 0.22 - 0.0612$

0.6688

c. What is $P(F^c)$? $1 - P(F) = 1 - 0.51 = 0.49$

d. What is the complement of H?

$1 - P(H) = 1 - 0.22 = 0.78$

6. Let the sample space, S = {all whole number from 5 through 20}
Let the event A = {5, 8, 10, 11, 14, 18, 19, 20}
Let the event B = {6, 8, 10, 12, 14, 16, 18, 20}
Let the event C = {5, 7, 9, 11, 13, 15, 17, 19}

Find the following:

a. $A \cap B$ = $\{8, 10, 14, 18, 20\}$

b. $P(A \cap B)$ = $5/16$

c. B^c = $\{5, 7, 9, 11, 13, 15, 17, 19\}$

d. $P(B \cap C)$ = 0

e. $P(A \cap C)$ = $3/16$

f. $P(A^c)$ = $8/16$

g. C U B = $\{5, 6, 7, 8, 9, \ldots, 18, 19, 20\}$

For the next 2 questions, put the probability statements into notation to help you.

7. On a certain day, there is a 21% chance of John being absent. The probability of there being a pop quiz **and** John being absent is 15%. What is the probability that there is a pop quiz **given that** John is absent?

$P(A) = 0.21$
$P(Q \cap A) = 0.15$

$P(Q|A) = \frac{P(A \cap Q)}{P(A)} = 0.15/0.21 = 0.7143$

8. The chance of Kelly wanting cereal for breakfast is 48%. The chance that Kelly has Milk in her fridge **and** her wanting cereal is 39%. What is the chance that Kelly has milk **given that** she wants cereal.

$P(C) = 0.48$
$P(m \cap C) = 0.39$

$P(m|C) = \frac{P(m \cap C)}{P(C)} = \frac{0.39}{0.48} = 0.8125$

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9. On a typical large plane, there are 150 seats. The chance that the plane is completely filled is 56%. The chance that the plane has 120 seats filled is 24%. The chance that the plane has 70 seats filled is 12% and the chance that the plane has only 30 seats filled is 8%.
   a. Create a probability model for the **number of passengers** on the plane

X	150	120	70	30
$P(X)$	0.56	0.24	0.12	0.08

   b. What is the expected attendance on a 747 flight?

$E(X) = 123.6$ people

   c. What is the chance that less than 100 seats will be filled?

$P(X < 100) = 0.20$

   d. What is the chance that more than 70 seats are filled?

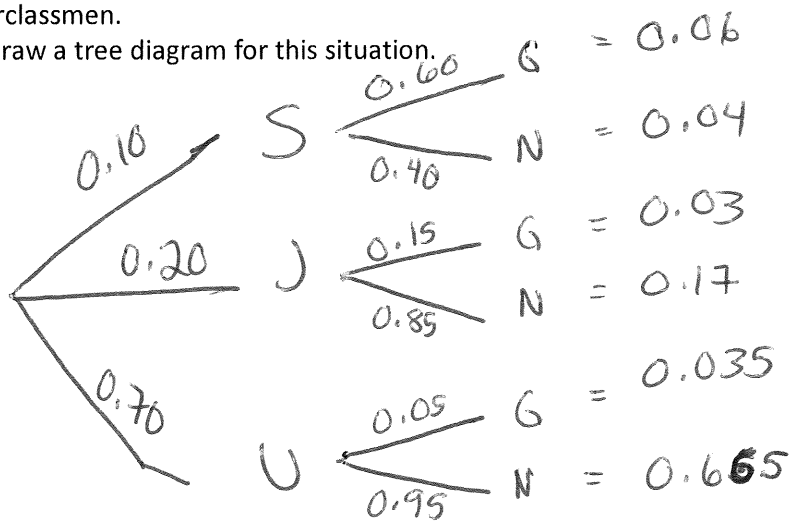
$P(X > 70) = 0.80$

   e. If there are 50 flights in a day, what is the total expected attendance?

$50 \times 123.6 = 6180$ people

10. For purposes of making on-campus housing assignments, a college separates its students by grade: Seniors, Juniors, and Underclassmen. Of the students who choose to live on campus, 10% are seniors, 20% are juniors, and the rest are underclassmen. The most desirable dorm is the newly constructed Gold dorm, and 60% of the seniors elect to live there. 15% of the juniors also live there, along with only 5% of the underclassmen.

a. Draw a tree diagram for this situation.



b. What is the probability that a randomly selected on-campus student lives in the Gold dorm?

$P(G) = 0.06 + 0.03 + 0.035 = 0.125$

c. Given that a student lives in the Gold dorm, what is the probability that they are a senior?

$P(S|G) = \frac{P(S \cap G)}{P(G)} = \frac{0.06}{0.125} = 0.48$

11. The following data is a survey from a large university on the type of driver and the origin of the car they drive. What is the probability that ...

Origin of car	Driver: Student	Staff	total
American	107	105	212
European	33	12	45
Asian	55	47	102
total	195	164	359

a. A person is a student?

$P(Stu) = 195/359$

b. A person drives a European car?

$P(E) = 45/359$

c. A person is a staff member and drives an Asian car?

$P(Sta \cap As) = 47/359$

d. A person is a student or drives an American car?

$P(Stu \cup Am) = 300/359$

e. A person is a student and drives a European car?

$P(Stu \cap E) = 33/359$

f. If we encounter a student, what is the probability that they drive an Asian car?

$P(As|Stu) = 55/195$

g. Given that someone is a staff member, what is the probability that they drive an American car?

$P(Am|Sta) = 105/164$

h. Are the two variables independent?

$P(Stu|E) = P(Stu)$?

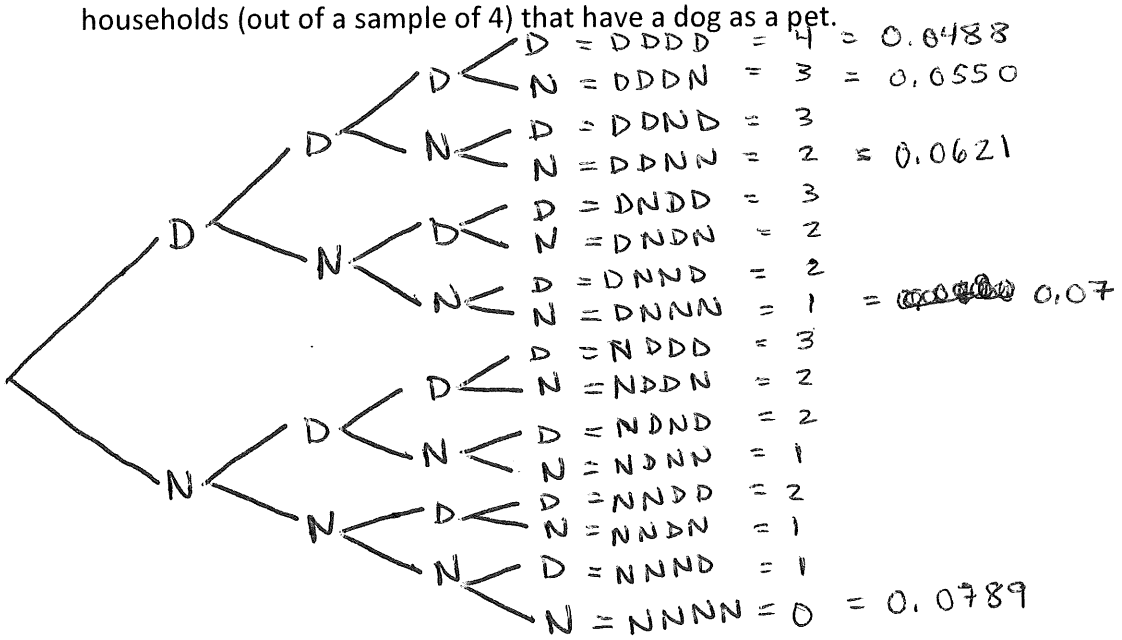
$33/45 = 195/359$?

$0.733 \neq 0.543$

No, not independent

(12) Suppose that 47% of American households have a dog as a pet.

a. Use a tree diagram to create the probability model for X, the number of American households (out of a sample of 4) that have a dog as a pet.



X	0	1	2	3	4	
P(x)	0.0789	0.28	0.3726	0.22	0.0488	= 1

b. What is the probability that there will be exactly 4 households with dogs?

$P(x=4) = 0.0488$

c. What is the probability that at least 3 households with dogs?

$P(x \geq 3) = 0.2688$

d. What is the probability that less than 2 households have dogs?

$P(x < 2) = 0.3589$

e. What is the probability that none of the households have a dog?

$P(x=0) = 0.0789$

f. What is the probability that at least 1 household has a dog?

$P(x \geq 1) = 0.9211$

12. Suppose that 47% of American households have a dog as a pet.
    a. Use a tree diagram to create the probability model for X, the number of American households (out of a sample of 4) that have a dog as a pet.

see other page

    b. What is the probability that there will be exactly 4 households with dogs?

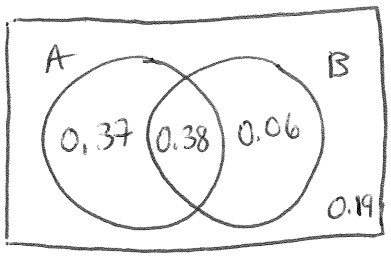
    c. What is the probability that at least 3 households with dogs?

    d. What is the probability that less than 2 households have dogs?

    e. What is the probability that none of the households have a dog?

    f. What is the probability that at least 1 household has a dog?

13. P(A) = 0.75; P(B) = 0.44; P(A and B) = 0.38
    a. Create the Venn Diagram
    b. P(A or B) = 0.81
    c. P(A^C and B) = 0.06
    d. P(A or B^C) = 0.94
    e. P(A and B^C) = 0.37



14. P(M) = 0.22; P(L) = 0.59; P(M and L) = 0.17
    a. Create the Venn Diagram
    b. P(M and L^C) = 0.05
    c. P(M^C and L^C) = 0.36
    d. P(M or L^C) = 0.58
    e. P(M^C or L^C) = 0.83